

Amendments to the Claims

This listing of the Claims will replace all prior versions and listings of the claims in this patent application.

Listing of the Claims

Claims 1-10 (canceled)

11. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

separating a wafer into multiple dies;

after said separating said wafer, joining one of said dies and a substrate, wherein an opening in said substrate exposes said one of said dies;

depositing a ~~solder~~ tin-containing ball into said opening; and

after said joining said one of said dies and said substrate, separating said substrate into multiple portions.

12. (previously presented) The method of claim 11, further comprising depositing a UBM layer over a pad of said wafer, followed by said separating said wafer, followed by said joining said one of said dies and said substrate, wherein said opening in said substrate exposes said UBM layer.

13. (currently amended) The method of claim 11, wherein said opening is formed in said substrate before said joining said one of said dies and said substrate.

Claim 14 (canceled)

15. (previously presented) The method of claim 11, wherein said one of said dies comprises a pad and a passivation layer, an opening in said passivation layer exposing said pad, and wherein said opening in said substrate exposes said pad.

Claim 16 (canceled)

17. (currently amended) The method of claim 11, wherein said one of said dies comprises a first pad, a second pad and a passivation layer, an opening in said passivation layer exposing a top surface of said second pad, said first pad being over said second pad and/or over said passivation layer, connected to said top surface, the position of said first pad from a top view being different from that of said second pad, said opening in said substrate exposing said first pad.

Claim 18 (canceled)

19. (previously presented) The method of claim 11 further comprising depositing an adhesive material over said substrate, followed by said joining said one of said dies and said substrate using said adhesive material.

20. (currently amended) The method of claim 11, after said joining said one of said dies and said substrate, further comprising ~~depositing a polymer layer encapsulating said one~~ of said dies with a molding material.

Claims 21 and 22 (canceled)

23. (previously presented) The method of claim 11, wherein said substrate comprises bismaleimide triazine (BT).

24. (currently amended) The method of claim 11, wherein said ~~solder~~ tin-containing ball comprises tin-silver alloy.

25. (previously presented) The method of claim 11, wherein said opening is formed using a process comprising mechanical drilling.

Claims 26-41 (canceled)

42. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

depositing an adhesive material over a substrate;

joining a first die and said substrate using said adhesive layer, wherein ~~an~~ a first opening in said substrate exposes a bottom surface of said first die; and

joining a second die and said substrate using said adhesive layer, wherein a second opening in said substrate exposes a bottom surface of said second die;

encapsulating a top surface and sidewall of said first die, a top surface and sidewall of said second die, and a gap between said first and second dies with a molding material, wherein said gap is filled completely with said molding material, and said molding material has a top surface with a first region over said gap and multiple second regions over said first and second dies, said first region being at a same horizontal level as said multiple second regions; and

after said encapsulating said top surface and sidewall of said first die, said top surface and sidewall of said second die, and said gap between said first and second dies with said molding material, ~~joining said die and said substrate,~~ separating said substrate into multiple portions.

43. (currently amended) The method of claim 42, wherein said first die comprises a UBM layer and a pad, said UBM layer being over said pad, and wherein said first opening exposes said UBM layer.

44. (currently amended) The method of claim 42, wherein said first die comprises a pad and a passivation layer, an opening in said passivation layer exposing said pad, and wherein said first opening in said substrate exposes said pad.

45. (currently amended) The method of claim 42, wherein said first die comprises a first pad, a second pad and a passivation layer, an opening in said passivation layer exposing a

~~top surface of said second pad, said first pad being over said second pad and/or over said passivation layer, connected to said top surface, the position of said first pad from a top view being different from that of said second pad, said first opening in said substrate exposing said first pad.~~

46. (currently amended) The method of claim 42, wherein said molding material comprises polymer. ~~after said joining said die and said substrate, further comprising depositing a polymer layer encapsulating said die.~~

47. (previously presented) The method of claim 42, wherein said substrate has a thickness of between 150 and 300 microns.

48. (currently amended) The method of claim 42, wherein said first opening is formed in ~~said substrate before said joining said first die and said substrate.~~

49. (previously presented) The method of claim 42, wherein said substrate comprises bismaleimide triazine (BT).

50. (currently amended) The method of claim 42, after said joining said first die and said ~~substrate, further comprising depositing a conductive material into said first opening.~~

51. (currently amended) The method of claim ~~50~~ 42, further comprising forming a tin-containing ball connected to said first die through said first opening. ~~wherein said conductive material comprises solder.~~

52. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

providing a die comprising a UBM layer and a first pad, said UBM layer being over said first pad; ~~and~~

joining said die and a substrate, wherein an opening in said substrate exposes said UBM layer; ~~and~~

separating said substrate into multiple portions.

53. (previously presented) The method of claim 52, after said joining said die and said substrate, further comprising depositing a conductive material into said opening.

54. (currently amended) The method of claim 53, wherein said conductive material comprises tin. ~~solder.~~

55. (previously presented) The method of claim 52, wherein said die comprises a passivation layer, an opening in said passivation layer exposing said first pad.

56. (currently amended) The method of claim 52, wherein said die comprises a second pad and a passivation layer, an opening in said passivation layer exposing ~~a top surface of~~

said second pad, said first pad being over said second pad and/or over said passivation layer. ~~connected to said top surface, the position of said first pad from a top view being different from that of said second pad.~~

Claim 57 (canceled)

58. (currently amended) The method of claim 52, after said joining said die and said substrate, further comprising ~~depositing a polymer layer encapsulating said die~~ with a molding material.

Claim 59 (canceled)

60. (previously presented) The method of claim 52 further comprising depositing an adhesive material over said substrate, followed by said joining said die and said substrate using said adhesive material.

61. (currently amended) The method of claim 52, wherein said opening is formed ~~in said substrate~~ before said joining said die and said substrate.

62. (previously presented) The method of claim 52, wherein said UBM layer comprises copper.

63. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

joining a die, separated from a wafer, and a substrate, wherein an opening in said substrate exposes a topmost patterned circuit layer of said die;

depositing a conductive material into said opening, wherein said conductive material is used to connect said topmost patterned circuit layer to an external circuitry; and

after said joining said die and said substrate, separating said substrate into multiple portions.

64. (currently amended) The method of claim 63, wherein said conductive material comprises tin. ~~solder~~.

65. (previously presented) The method of claim 63, wherein said conductive material comprises tin-lead alloy.

66. (previously presented) The method of claim 63, wherein said external circuitry comprises a next level of packaging.

67. (previously presented) The method of claim 63, wherein said topmost patterned circuit layer comprises a UBM layer and a pad, said UBM layer being over said pad, and wherein said opening in said substrate exposes said UBM layer.

68. (previously presented) The method of claim 63, wherein said die comprises a passivation layer, an opening in said passivation layer exposing a pad of said topmost patterned circuit layer, and wherein said opening in said substrate exposes said pad.

69. (currently amended) The method of claim 63, wherein said die comprises a first pad and a passivation layer, an opening in said passivation layer exposing a ~~top surface of~~ said first pad, and wherein said topmost patterned circuit layer comprises a second pad over said first pad and/or over said passivation layer, connected to said top surface, the ~~position of said first pad from a top view being different from that of said second pad,~~ said opening in said substrate exposing said second pad.

Claim 70 (canceled)

71. (currently amended) The method of claim 63, after said joining said die and said substrate, further comprising ~~depositing a polymer layer encapsulating said die~~ with a molding material.

Claim 72 (canceled)

73. (previously presented) The method of claim 63 further comprising depositing an adhesive material over said substrate, followed by said joining said die and said substrate using said adhesive material.

74. (currently amended) The method of claim 63, wherein said opening is formed ~~in said substrate~~ before said joining said die and said substrate.

Claims 75-101 (canceled)

102. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

depositing a UBM layer over a first pad of a wafer;

separating said wafer into multiple dies;

joining one of said dies and a substrate, wherein an opening in said substrate exposes said UBM layer; and

depositing a conductive material into said opening.

103. (currently amended) The method of claim 102, wherein said conductive material comprises tin ~~solder~~.

104. (previously presented) The method of claim 102, wherein said wafer comprises a passivation layer, an opening in said passivation layer exposing said first pad.

105. (currently amended) The method of claim 102, wherein said wafer comprises a second pad and a passivation layer, an opening in said passivation layer exposing ~~a top surface of~~ said second pad, said first pad being over said second pad and/or over said

passivation layer. ~~connected to said top surface, the position of said first pad from a top view being different from that of said second pad.~~

106. (previously presented) The method of claim 102, after said depositing said conductive material, further comprising separating said substrate into multiple portions.

107. (currently amended) The method of claim 102, after said joining said one of said dies and said substrate, further comprising ~~depositing a polymer layer encapsulating said~~ one of said dies with a molding material.

Claim 108 (canceled)

109. (previously presented) The method of claim 102, further comprising depositing an adhesive material over said substrate, followed by said joining said one of said dies and said substrate using said adhesive material.

110. (currently amended) The method of claim 102, wherein said opening is formed ~~in said substrate~~ before said joining said one of said dies and said substrate.

111. (previously presented) The method of claim 102, wherein said UBM layer comprises copper.

Claims 112-116 (Canceled)

117. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

providing a die comprising a passivation layer and a metal layer, said metal layer being over said passivation layer; and

joining said die and a substrate, wherein an opening in said substrate exposes said metal layer.

118. (currently amended) The method of claim 117, wherein said opening is formed ~~in said substrate~~ before said joining said die and said substrate.

119. (currently amended) The method of claim 117, wherein said metal layer comprises a UBM layer exposed by said opening in said substrate.

120. (previously presented) The method of claim 119, wherein said UBM layer comprises copper.

121. (currently amended) The method of claim 117, after said joining said die and said substrate, further comprising ~~depositing a polymer layer encapsulating said die~~ with a molding material.

Claim 122 (canceled)

123. (previously presented) The method of claim 117 further comprising depositing an adhesive material over said substrate, followed by said joining said die and said substrate using said adhesive material.

124. (previously presented) The method of claim 117, after said joining said die and said substrate, further comprising depositing a conductive material into said opening.

125. (currently amended) The method of claim 124, wherein said conductive material comprises tin solder.

126. (currently amended) The method of claim 117, wherein said die further comprises a pad exposed by an opening in said passivation layer, said metal layer being over said pad and/or over said passivation layer. ~~connected to said pad.~~

127. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

providing a die, separated from a wafer, comprising a pad and a passivation layer, an opening in said passivation layer exposing said pad;

depositing an adhesive material over a said substrate; and

joining said die and a substrate using said adhesive material, an opening in said substrate exposing said pad;

encapsulating a top surface and sidewall of said die with a molding material; and

after said encapsulating said top surface and sidewall of said die with said molding material, separating said molding material and said substrate into multiple portions.

128. (currently amended) The method of claim 127, wherein said opening ~~is formed in~~ said substrate is formed before said joining said die and said substrate.

129. (currently amended) The method of claim 127, wherein said molding material comprises polymer. ~~after said joining said die and said substrate, further comprising depositing a polymer layer encapsulating said die.~~

Claims 130 and 131 (canceled)

132. (currently amended) The method of claim 127, after said joining said die and said substrate, further comprising depositing a conductive material into said opening in said substrate. ~~openings.~~

133. (currently amended) The method of claim 127, 132, ~~further comprising forming a tin-containing ball connected to said die through said opening. wherein said conductive material comprises solder.~~

134. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

separating a wafer into multiple dies;

after said separating said wafer, joining one of said dies and a substrate, an opening in said substrate exposing said one of said dies; ~~and~~

after said joining said one of said dies and said substrate, encapsulating a top surface and sidewall of said one of said dies with a molding material; and

after said encapsulating said top surface and sidewall of said one of said dies with said molding material, separating said molding material and said substrate into multiple portions.

135. (previously presented) The method of claim 134 further comprising depositing a UBM layer over a pad of said wafer, followed by said separating said wafer, followed by said joining said one of said dies and said substrate, wherein said opening exposes said UBM layer.

136. (currently amended) The method of claim 134, wherein said opening is formed ~~in said substrate~~ before said joining said one of said dies and said substrate.

137. (previously presented) The method of claim 134, wherein said one of said dies comprises a pad and a passivation layer, an opening in said passivation layer exposing said pad, and wherein said opening in said substrate exposes said pad.

138. (currently amended) The method of claim 134, wherein said one of said dies comprises a first pad, a second pad and a passivation layer, an opening in said passivation

layer exposing ~~a top surface of said second pad, said first pad being over said second pad and/or over said passivation layer, connected to said top surface, the position of said first pad from a top view being different from that of said second pad,~~ said opening in said substrate exposing said first pad.

139. (previously presented) The method of claim 134 further comprising depositing an adhesive material over said substrate, followed by said joining said one of said dies and said substrate using said adhesive material.

140. (currently amended) The method of claim 134, wherein said molding material comprises polymer. ~~after said joining said one of said dies and said substrate, further comprising depositing a polymer layer encapsulating said one of said dies.~~

141. (previously presented) The method of claim 134, wherein said substrate has a thickness of between 150 and 300 microns.

Claim 142 (canceled)

143. (previously presented) The method of claim 134, wherein said substrate comprises bismaleimide triazine (BT).

144. (currently amended) The method of claim 134, after said joining said one of said dies and said substrate, further comprising forming a tin-containing ball connected to said

one of said dies through said opening. ~~depositing a conductive material into said opening.~~

145. (previously presented) The method of claim 134, wherein said opening is formed using a process comprising mechanical drilling.

146. (previously presented) The method of claim 11, wherein said opening is formed using a process comprising laser drilling.

147. (previously presented) The method of claim 11, wherein said substrate has a thickness of between 150 and 300 microns.

148. (previously presented) The method of claim 12, wherein said UBM layer comprises copper.

149. (previously presented) The method of claim 12, wherein said UBM layer comprises nickel.

Claim 150 (canceled)

151. (currently amended) The method of claim 42, wherein said first opening is formed using a process comprising laser drilling.

152. (currently amended) The method of claim 42, wherein said first opening is formed using a process comprising mechanical drilling.

153. (previously presented) The method of claim 43, wherein said UBM layer comprises copper.

154. (previously presented) The method of claim 43, wherein said UBM layer comprises nickel.

Claim 155 (canceled)

156. (previously presented) The method of claim 52, wherein said UBM layer comprises nickel.

Claim 157 (canceled)

158. (previously presented) The method of claim 52, wherein said substrate has a thickness of between 150 and 300 microns.

159. (previously presented) The method of claim 52, wherein said opening is formed using a process comprising laser drilling.

160. (previously presented) The method of claim 52, wherein said opening is formed using a process comprising mechanical drilling.

161. (previously presented) The method of claim 52, wherein said substrate comprises bismaleimide triazine (BT).

162. (previously presented) The method of claim 67, wherein said UBM layer comprises copper.

163. (previously presented) The method of claim 67, wherein said UBM layer comprises nickel.

Claim 164 (canceled)

165. (previously presented) The method of claim 63, wherein said substrate has a thickness of between 150 and 300 microns.

166. (previously presented) The method of claim 63, wherein said opening is formed using a process comprising laser drilling.

167. (previously presented) The method of claim 63, wherein said opening is formed using a process comprising mechanical drilling.

168. (previously presented) The method of claim 63, wherein said substrate comprises bismaleimide triazine (BT).

169. (previously presented) The method of claim 102, wherein said UBM layer comprises nickel.

Claim 170 (canceled)

171. (previously presented) The method of claim 102, wherein said substrate has a thickness of between 150 and 300 microns.

172. (previously presented) The method of claim 102, wherein said opening is formed using a process comprising laser drilling.

173. (previously presented) The method of claim 102, wherein said opening is formed using a process comprising mechanical drilling.

174. (previously presented) The method of claim 102, wherein said substrate comprises bismaleimide triazine (BT).

175. (previously presented) The method of claim 119, wherein said UBM layer comprises nickel.

Claim 176 (canceled)

177. (previously presented) The method of claim 117, wherein said substrate has a thickness of between 150 and 300 microns.

178. (previously presented) The method of claim 117, wherein said opening is formed using a process comprising laser drilling.

179. (previously presented) The method of claim 117, wherein said opening is formed using a process comprising mechanical drilling.

180. (previously presented) The method of claim 117, wherein said substrate comprises bismaleimide triazine (BT).

181. (previously presented) The method of claim 127, wherein said substrate has a thickness of between 150 and 300 microns.

182. (currently amended) The method of claim 127, wherein said opening in said substrate is formed using a process comprising laser drilling.

183. (currently amended) The method of claim 127, wherein said opening in said substrate is formed using a process comprising mechanical drilling.

184. (previously presented) The method of claim 127, wherein said substrate comprises bismaleimide triazine (BT).

185. (previously presented) The method of claim 135, wherein said UBM layer comprises copper.

186. (previously presented) The method of claim 135, wherein said UBM layer comprises nickel.

Claim 187 (canceled)

188. (previously presented) The method of claim 134, wherein said opening is formed using a process comprising laser drilling.

Claims 189-194 (canceled)

195. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

providing a die, separated from a wafer, comprising a first pad, a second pad and a passivation layer ~~and a circuit layer over said passivation layer~~, an opening in said passivation layer exposing ~~a top surface of said first pad~~, said second pad being over said first pad and/or over said passivation layer; ~~wherein said circuit layer comprises a second~~

~~pad connected to said top surface, the position of said first pad from a top view being different from that of said second pad;~~

joining a said die, ~~separated from a wafer~~, and a substrate, wherein an opening in said substrate exposes said second pad; and

depositing a conductive material into said opening in said substrate, wherein said conductive material is used to connect said second pad to an external circuitry.

196. (currently amended) The method of claim 195, after said joining said die and said substrate, further comprising ~~depositing a polymer layer encapsulating said die~~ with a molding material.

197. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

depositing an adhesive material over a substrate;

after said depositing said adhesive material, joining a die, separated from a wafer, and said a-substrate using said adhesive material, wherein an opening in said substrate exposes a topmost patterned circuit layer of said die; and

depositing a conductive material into said opening, wherein said conductive material is used to connect said topmost patterned circuit layer to an external circuitry.

198. (previously presented) The method of claim 197, wherein said topmost patterned circuit layer comprises a UBM layer and a pad, said UBM layer being over said pad, and wherein said opening in said substrate exposes said UBM layer.

199. (previously presented) The method of claim 198, wherein said UBM layer comprises copper.

200. (previously presented) The method of claim 198, wherein said UBM layer comprises nickel.

Claim 201 (canceled)

202. (currently amended) The method of claim 197, after said joining said die and said substrate, further comprising ~~depositing a polymer layer encapsulating said die~~ with a molding material.

Claims 203-208 (canceled)

209. (currently amended) A method of fabricating a chip ~~an electronic package~~ comprising the steps of:

providing a die, separated from a wafer, comprising a circuit layer with a UBM layer and a pad, said UBM layer being over said pad;

joining said die, ~~separated from a wafer~~, and a substrate, wherein an opening in said substrate exposes said UBM layer; ~~and~~

depositing a conductive material into said opening, wherein said conductive material is used to connect said topmost patterned circuit layer to an external circuitry; and-

separating said substrate into multiple portions.

210. (previously presented) The method of claim 209, wherein said UBM layer comprises copper.

211. (previously presented) The method of claim 209, wherein said UBM layer comprises nickel.

Claim 212 (canceled)

213. (currently amended) The method of claim 209, after said joining said die and said substrate, further comprising ~~depositing a polymer layer encapsulating said die~~ with a molding material.

214. (new) The method of claim 42, wherein said depositing said adhesive material over said substrate comprises printing.

215. (new) The method of claim 42, wherein said adhesive material has a thickness of between 10 and 100 microns.

216. (new) The method of claim 42, wherein said adhesive material comprises polyimide.

217. (new) The method of claim 42, wherein said adhesive material comprises a thermocompression material.

218. (new) The method of claim 42, wherein said molding material comprises resin.

219. (new) The method of claim 42, wherein said molding material comprises epoxy.

220. (new) The method of claim 42, wherein said molding material has a thickness of between 100 and 500 microns.

221. (new) The method of claim 127, wherein said depositing said adhesive material over said substrate comprises printing.

222. (new) The method of claim 127, wherein said adhesive material has a thickness of between 10 and 100 microns.

223. (new) The method of claim 127, wherein said adhesive material comprises polyimide.

224. (new) The method of claim 127, wherein said adhesive material comprises a thermocompression material.

225. (new) The method of claim 127, wherein said molding material comprises resin.

226. (new) The method of claim 127, wherein said molding material comprises epoxy.

227. (new) The method of claim 127, wherein said molding material has a thickness of between 100 and 500 microns.

228. (new) The method of claim 139, wherein said depositing said adhesive material over said substrate comprises printing.

229. (new) The method of claim 139, wherein said adhesive material has a thickness of between 10 and 100 microns.

230. (new) The method of claim 139, wherein said adhesive material comprises polyimide.

231. (new) The method of claim 139, wherein said adhesive material comprises a thermocompression material.

232. (new) The method of claim 134, wherein said molding material comprises resin.

233. (new) The method of claim 134, wherein said molding material comprises epoxy.

234. (new) The method of claim 134, wherein said molding material has a thickness of between 100 and 500 microns.